

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Philippe Desbois et al.

Application No.: 10/595,637

Confirmation No.: 3877

Filed: May 2, 2006

Art Unit: 1796

For: METHOD FOR THE ANIONIC
POLYMERISATION OF OXIRANS

Examiner: M. C. McCulley

APPEAL BRIEF

MS Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Madam:

As required under § 41.37(a), this brief is filed more than two months after the Notice of Appeal filed in this case on February 17, 2009, and is in furtherance of said Notice of Appeal.

The fees required under § 41.20(b)(2) are dealt with in the accompanying
TRANSMITTAL OF APPEAL BRIEF.

This brief contains items under the following headings as required by 37 C.F.R. § 41.37 and M.P.E.P. § 1205.2:

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|------------|---|
| I. | Real Party In Interest |
| II | Related Appeals and Interferences |
| III. | Status of Claims |
| IV. | Status of Amendments |
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I. REAL PARTY IN INTEREST

The real party in interest for this appeal is:

BASF Aktiengesellschaft (BASF SE) of Ludwigshafen, Germany

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

A. Total Number of Claims in Application

There are 20 claims pending in the application.

B. Current Status of Claims

1. Claims canceled: 0
2. Claims withdrawn from consideration but not canceled: 0
3. Claims pending: 1-20
4. Claims allowed: 0
5. Claims rejected: 1-20

C. Claims On Appeal

The claims on appeal are claims 1-20.

IV. STATUS OF AMENDMENTS

Applicant did not file an Amendment After Final Rejection. A Preliminary Amendment was filed on May 2, 2006. The claims appealed herein are the claims of record and considered in the Non-Final Office Action of April 1, 2008, the Amendment filed on December 12, 2008 in reply to the Non-Final Office Action, and the Final Office Action of February 17, 2009.

V. SUMMARY OF CLAIMED SUBJECT MATTER

This section includes a concise explanation of the subject matter defined in each of the independent claims involved in the appeal (i.e., claim 1), which includes references to the specification, figures and other information as specified in 37 C.F.R. § 41.37.

The claimed subject matter relates to a process for preparation of homopolymers composed of oxiranes, or of copolymers composed of oxiranes and comonomers, via anionic polymerization. The process involves carrying out a polymerization in the presence of a quaternary ammonium and/or phosphonium compound and of a mononuclear organylaluminum compound of the formula R_3-Al , where the radicals R are, independently of one another, hydrogen, halogen, C_{1-20} -alkyl, C_{6-20} -aryl, or C_{7-20} -arylalkyl. The independent claim involved in this appeal is discussed at page 1, lines 5-9 and page 2, lines 9-38 of the specification.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. A rejection for review on appeal is of claims 1, 2, 4-7, 10, 12, 14, 16, 17, 19 and 20 rejected under 35 U.S.C. § 102(b) as anticipated by Braune et al. ("An Efficient Method for Controlled Propylene Oxide Polymerization: The Significance of Bimetallic Activation in Aluminum Lewis Acids") ("Braune").

B. A rejection for review on appeal is of claims 3, 13, 15 and 18 rejected under 35 U.S.C. § 103(a) as obvious over Braune et al. in view of Yu (U.S. Patent No. 5,010,139) ("Yu").

C. A rejection for review on appeal is of claims 8 and 9 rejected under 35 U.S.C. § 103(a) as obvious over Braune et al. in view of McGee et al. (US Publication No. 2002/0010268) ("McGee").

D. A rejection for review on appeal is of claim 11 rejected under 35 U.S.C. § 103(a) as obvious over Braune et al in view of Yu.

VII. ARGUMENTS

A. Braune Fails to Describe or Suggest the Process of Claim 1.

The claimed process for preparation of homopolymers composed of oxiranes, or of copolymers composed of oxiranes and comonomers, via anionic polymerization is not anticipated by Braune.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” MPEP § 2131 (citing *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). “The identical invention must be shown in as complete detail as is contained in the . . . claim.” *Id.* (citing *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989)).

In the present case, the identical process has not been shown or proven in complete detail in the cited reference of record, since the process specifically comprises:

carrying out a polymerization in the presence of a quaternary ammonium and/or phosphonium compound and of a *mononuclear organylaluminum compound of the formula R_3-Al , where the radicals R are, independently of one another, hydrogen, halogen, C_{1-20} -alkyl, C_{6-20} -aryl, or C_{7-20} -arylalkyl.*

Present claim 1. (Emphasis added).

Braune describes initiator combinations for polypropylene oxide polymerization, including aluminum complexes. See page 64, column 2.

However, as Appellant has pointed out in the Response filed July 1, 2008 at page 2, line 21-26, the reference does not describe the claimed initiator combination, which includes the specific mononuclear organylaluminum compound of formula R_3-Al . In particular, Braune describes initiator combinations that include aluminum alcoholates, e.g., isopropanolate. See page 65, columns 1 and 2. By contrast, the claimed process is carried out in the presence of compounds which include, for example, alkyl aluminum compounds, aluminum halides, or aluminum hydrides. See, e.g., page 7, lines 1 to 5 of the present specification.

Appellant has also pointed out, as described in the present specification, a process with the claimed specific combination provides polypropylene oxides with substantially higher molecular weights in shorter reaction times. See the Examples of the present specification,

beginning at page 16. the polymerization times are markedly shorter than those in the other processes, the desired polymerization time being at most 48 hours, which does not result in polyoxiranes with lower molecular weight.

By contrast, as described at page 2, line 33 through page 3, line 2 of the present specification, Braune describes a process that is complicated and costly, in which “after 3 hours of reaction time the number-average molecular weight of the PPO is only from about 1100 to at most 3600.”

In reply, the Office has alleged in the Response to Arguments at page 6 of the Office Action mailed October 15, 2008, page 6, lines 1-7, that Braune describes using a mononuclear organylaluminum compound which falls within the claimed mononuclear organylaluminum compound. The Office has also alleged that Appellant’s arguments regarding higher molecular weight and shorter reaction time results are not persuasive, since Braune teaches that the polymerization occurred with pronounced speed and control at room temperature. *Id.* at lines 8-12.

However, as pointed out by Appellant in the Response filed January 15, 2009 at pages 2-3, and as mentioned in the present specification at pages 2 to 3, Braune generally describes the polymerization of propylene oxide using mixtures of specific aluminum complexes. In a multistage synthesis, neutral aluminum complexes $[\text{Al}(\text{L})\text{Cl}]_2$ and $[\text{Al}(\text{L})\text{OiPr}]_2$ are first prepared and isolated, these being binuclear, i.e., comprising two Al atoms per molecule. These binuclear complexes are reacted with $\text{Net}_4\text{-Cl}$ or $\text{Net}_4\text{-OiPr}$ to give anionic complexes $[\text{Net}_4][\text{Al}(\text{L})\text{Cl}_2]$ and, respectively, $[\text{Net}_4][\text{Al}(\text{L})(\text{OiPr})_2]$, and these are likewise isolated. L here is 2,2'-methylenebis(6-tert-butyl-4-methylphenol) or 2,2'-methylenebis[4-methyl-6-(1-methylcyclohexyl)phenol], OiPr is isopropanolate, and Et is ethyl. It is said that PO can only be polymerized if the neutral (binuclear) and anionic complexes are used together. The preparation and isolation of the complex compounds described are complicated and costly, and after 3 hours of reaction time the number-average molecular weight of the PPO is only from about 1100 to at most 3600.

According to the claimed invention, mononuclear organoaluminum compounds are used, which comprise one aluminum atom per molecule (formula unit), contrasting with polynuclear organyl compounds which have two or more aluminum atoms in the molecule. On the other

hand, by way of example, binuclear organoaluminum compounds are used as described in Braune.

Therefore, in the above contrasts, the claimed invention is clearly not anticipated by or obvious over Braune. Accordingly, the rejection should be withdrawn.

B. Braune and Yu, Alone or in Combination, Fail to Describe or Suggest the Process of Claims 3, 13, 15 and 18.

The claimed process for preparation of homopolymers composed of oxiranes, or of copolymers composed of oxiranes and comonomers, via anionic polymerization is not *prima facie* obvious over the cited prior art of record.

An obviousness analysis under 35 U.S.C. § 103 requires, *inter alia*, consideration of the differences between prior art references and the claims at issue. See *KSR International Co. v. Teleflex Inc.*, 127 S.Ct. 1727 (2007) (“KSR”) (citing *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17-18, 86 S.Ct. 684 (1966) (“*Graham*”) (describing factors that control an obviousness inquiry). In *Graham*, the U.S. Supreme Court (“Court”) set forth the framework for applying the statutory language of 35 U.S.C. § 103, and in *KSR* the Court determined that the *Graham* factors were still useful and provided “helpful insight” to an obviousness inquiry. *KSR*, 127 S. Ct. at 1741. The Court further indicated that a “teaching, suggestion, motivation” to combine need not be explicit in every case. *Id.* (referring to a mechanical device application, in which the Court determined that merely adding a previously existing sensor for detecting pedal movement to a previously existing adjustable throttle pedal was not inventive).

However, in making its obviousness determination, the Court indicated the importance of identifying a “reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.” *Takeda Chem. Indus., v. Alphapharm Pty. Ltd.*, 492 F.3d 1350, 1356-57 (Fed. Cir. 2007) (“*Takeda*”) (quoting *KSR*, 127 S. Ct. at 1731). In the chemical case *Takeda*, the U.S. Court of Appeals for the Federal Circuit concurred with the Court’s reasoning by also emphasizing that there must be some identified reason that would have “prompted” a chemist to make a modification in a particular manner to establish *prima facie* obviousness. 492 F.3d at 1350; see also *Ex parte Martin Haubner and Rolf Pinkos*, Appeal No. 2009-0449 (explaining that “in rejecting claims under 35 U.S.C. § 103, the

examiner bears the initial burden of presenting a case of *prima facie* obviousness,” and finding that the process claims were not obvious over the cited combination of references).

In the present case, the Office has not demonstrated that the cited references describe or suggest the claimed process in light of the differences between the cited references and the claimed invention; or shown that one skilled in the art would have been prompted to combine the references to achieve the claimed process.

As discussed *supra*, Braune fails as a reference, since it does not describe the initiator combination of the claimed process. In addition, as acknowledged and appreciated by the Office in the Office Action mailed April 1, 2008 at page 4, lines 4-5, Braune is clearly deficient since “[n]ot disclosed is the copolymer with comonomers selected from styrene, α -methylstyrene, butadiene, isoprene or mixtures of these.”

The Office has alleged at page 4, lines 8-13 in the Office Action mailed April 1, 2008 that it would have been obvious to modify a polymer of Braune with a styrene monomer of Yu to improve antistatic performance. However, there is no guidance or suggestion in Yu that one would pick and choose styrene, and there clearly is no indication that one would arbitrarily modify the synthesis/polymerization of propylene oxide with using mixtures of *specific* aluminum complexes, as described in Braune, to achieve the claimed process. Therefore, the rejection is improper and should be withdrawn.

C. Braune and McGee, Alone or in Combination, Fail to Describe or Suggest the Process of Claims 8 and 9.

As discussed *supra*, the claimed process for preparation of homopolymers composed of oxiranes, or of copolymers composed of oxiranes and comonomers, via anionic polymerization is not *prima facie* obvious over the cited prior art of record.

As acknowledged and appreciated by the Office in the Office Action mailed April 1, 2008 at page 4, lines 4-5, Braune is clearly deficient since “[n]ot disclosed is a first polymerizing [] comonomer and then polymerizing the polyoxirane while concomitant use of [an] alkali metal compound is made.” The Office has alleged at page 5, lines 7-17 in the Office Action mailed April 1, 2008 that it would have been obvious to modify the polymerization described

Braune with McGee to include the above specific sequential polymerization described in the present claims, i.e., for adhesion and lower cost.

However, Appellant points out that the Office has not shown or provided any explicit analysis or reasoning as to how one would modify the rapid and controlled polymerization described in Braune with the reaction scheme of McGee without hindering the object described therein, e.g., the efficiency of the rapid and controlled process. Therefore, Office clearly has not shown that the combination of references would be obvious. Accordingly, the rejection is improper and should be withdrawn.

D. Braune and Yu, Alone or in Combination, Fail to Describe or Suggest the Process of Claim 11.

As discussed *supra* in section VII B. regarding Yu and the Office's acknowledgement that Braune does not disclose the claimed comonomers, Appellant points out that there is no guidance or suggestion in Yu that one would pick and choose styrene. Further, when considered as a whole, there clearly is no indication in the references that one would arbitrarily modify the synthesis/polymerization of propylene oxide with using mixtures of *specific* aluminum complexes, as described in Braune, to achieve the claimed process. Therefore, the rejection is improper and should be withdrawn.

VIII. CLAIMS

A copy of the claims involved in the present appeal is attached hereto as Appendix A. As indicated above, the claims in Appendix A include the amendments filed by Appellant on May 2, 2006.

If any additional fees are due with the filing of this brief, please charge our Deposit Account No. 03-2775, under Order No. 12810-00247-US1 from which the undersigned is authorized to draw.

Dated: July 17, 2009

Respectfully submitted,

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APPENDIX A

Claims Involved in the Appeal of Application Serial No. 10/595,637

1. (Original) A process for preparation of homopolymers composed of oxiranes, or of copolymers composed of oxiranes and comonomers, via anionic polymerization, which comprises carrying out a polymerization in the presence of a quaternary ammonium and/or phosphonium compound and of a mononuclear organylaluminum compound of the formula R_3Al , where the radicals R are, independently of one another, hydrogen, halogen, C_{1-20} -alkyl, C_{6-20} -aryl, or C_{7-20} -arylalkyl.
2. (Original) The process according to claim 1, wherein the oxiranes have been selected from propylene oxide, ethylene oxide, and mixtures of these.
3. (Previously Presented) The process according to claim 1, wherein the comonomers have been selected from styrene, α -methylstyrene, butadiene, isoprene, and mixtures of these.
4. (Previously Presented) The process according to claim 1, wherein the quaternary ammonium or phosphonium compound has the formula NR_4-X or PR_4-X , where R is identical or different alkyl having from 1 to 10 carbon atoms, and X is halogen, OH, or an alcoholate radical having from 1 to 10 carbon atoms.
5. (Previously Presented) The process according to claim 1, wherein trialkylaluminum compounds are used as organylaluminum compound.

6. (Previously Presented) The process according to claim 1, wherein the molar ratio of organylaluminum compound to quaternary ammonium or phosphonium compound, calculated as aluminum atoms to nitrogen atoms or phosphorus atoms, is from 1.5:1 to 100:1.

7. (Previously Presented) The process according to claim 1, wherein the quaternary ammonium or phosphonium compound is added first and then the organylaluminum compound is added.

8. (Previously Presented) The process according to claim 1, wherein the copolymers are block copolymers, and sequential polymerization is first used to polymerize the comonomer to give a polymer block B, and then the oxirane is polymerized to give a polyoxirane block A.

9. (Original) The process according to claim 8, wherein concomitant use is made of an alkali metal compound during the polymerization of the polymer block B.

10. (Previously Presented) The process according to claim 1, wherein polymerization is carried out in the presence of a quaternary ammonium compound and of a mononuclear organylaluminum compound.

11. (Previously Presented) The process according to claim 2, wherein the comonomers have been selected from styrene, α -methylstyrene, butadiene, isoprene, and mixtures of these.

12. (Previously Presented) The process according to claim 2, wherein the quaternary ammonium or phosphonium compound has the formula $\text{NR}_4\text{-X}$ or $\text{PR}_4\text{-X}$, where R is identical or

different alkyl having from 1 to 10 carbon atoms, and X is halogen, OH, or an alcoholate radical having from 1 to 10 carbon atoms.

13. (Previously Presented) The process according to claim 3, wherein the quaternary ammonium or phosphonium compound has the formula NR_4-X or PR_4-X , where R is identical or different alkyl having from 1 to 10 carbon atoms, and X is halogen, OH, or an alcoholate radical having from 1 to 10 carbon atoms.

14. (Previously Presented) The process according to claim 2, wherein trialkylaluminum compounds are used as organylaluminum compound.

15. (Previously Presented) The process according to claim 3, wherein trialkylaluminum compounds are used as organylaluminum compound.

16. (Previously Presented) The process according to claim 4, wherein trialkylaluminum compounds are used as organylaluminum compound.

17. (Previously Presented) The process according to claim 2, wherein the molar ratio of organylaluminum compound to quaternary ammonium or phosphonium compound, calculated as aluminum atoms to nitrogen atoms or phosphorus atoms, is from 1.5:1 to 100:1.

18. (Previously Presented) The process according to claim 3, wherein the molar ratio of organylaluminum compound to quaternary ammonium or phosphonium compound, calculated as aluminum atoms to nitrogen atoms or phosphorus atoms, is from 1.5:1 to 100:1.

19. (Previously Presented) The process according to claim 4, wherein the molar ratio of organylaluminum compound to quaternary ammonium or phosphonium compound, calculated as aluminum atoms to nitrogen atoms or phosphorus atoms, is from 1.5:1 to 100:1.

20. (Previously Presented) The process according to claim 5, wherein the molar ratio of organylaluminum compound to quaternary ammonium or phosphonium compound, calculated as aluminum atoms to nitrogen atoms or phosphorus atoms, is from 1.5:1 to 100:1.

APPENDIX B

No evidence pursuant to §§ 1.130, 1.131, or 1.132 or entered by or relied upon by the examiner is being submitted.

APPENDIX C

No related proceedings are referenced in II. above, hence copies of decisions in related proceedings are not provided.